ENGINEERING DATA TRANSMITTAL

1. EDT 822281
1A. Page 1 of 1

2. To: (Receiving Organization) Distribution	3. From: (Originating Organization) ATS Engineering	4. Related EDT No.: N/A
		5. Structure Location: IDF, 200E
6. Proj./Prog./Dept./Div.: Integrated Disposal Facility	7. Responsible Engineer/Design Agent: H. L. Baune	8. System Designator: N/A
		9. Building No.: N/A
10. Originator Remarks: These IQRPE Installation Assessement Reports are being issued for approval and release.		11. Equipment ID No. (EIN): N/A
		12. Permit/Permit Application No.: WA7890008967 Part III OU11
13. USQ No.: N/A Date: N/A ☒ N/A	13(A). TBDs or HOLDs In the Data Transmitted? ☐ Yes ☒ No 13(B). Project Number or Identifier: Integrated Disposal Facility	14. Purchase Order No.: N/A
		15. Required Response Date: N/A

16. DATA TRANSMITTED

(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Hard-copy or PDF	(G) Approval Designator	(H) Reason for Transmittal	(I) Originator Disposition	(J) Receiver Disposition
1 *	RPP-RPT-29447	N/A	0	Independent Qualified Registered Professional	H	E	1	1	1
				Engineer Installation Assessment Report For					
				The Integrated Disposal Facility (IDF) Leachate					
				Tank System (Cell 1)					
2	RPP-RPT-29448	N/A	0	Independent Qualified Registered Professional	H	E	1	1	1
				Engineer Installation Assessment Report For					
				The Integrated Disposal Facility (IDF) Leachate					
				Tank System (Cell 2)					

17. IMPACTED DOCUMENTS – NON ENGINEERING		18. IMPACTED DOCUMENTS – ENGINEERING	
Type of Document	Document Number	Type of Document	Document Number
N/A	N/A	N/A	N/A

19. KEY

Approval Designator (G)	Reason for Transmittal (H)	Disposition (I)
See TFC-ENG-DESIGN-C-25	1. Approval 2. Review 3. Distribution	1. Approved 2. Approved w/comment 3. Reviewed no comment 4. Reviewed w/comment 5. Disapproved

20. SIGNATURE/DISTRIBUTION

(H) Reason	(I) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(H) Reason	(I) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN
1	1	Originator H. L. Baune	HL Baune	10/26/06	T6-04	3	N/A	K. A. Colosi			T6-04
1	1	Resp. Engr. H. L. Baune	HL Baune	10/26/06	T6-04			N/A			
1	1	Resp. Mgr. S. L. Brey	Steve Brey	10/26/06	T6-04			N/A			
		QA N/A						N/A			
		H&S Engr N/A						N/A			
1	1	Env. Engr. T. A. Wooley	for FRMiner *(6H)	11/2/06	H6-03	21. DOE APPROVAL (if required)					
1	1	Project Manager G. L. Parsons	GL Parsons	10/26/06	T6-04	Ctrl. No. N/A					
3	N/A	IDF Project Files			R1-29	22. Release Date/Station/ID NOV 02 2006 STA: 15 (65)					
3	N/A	D. C. Comstock			T6-04						

BD-7400-172.2 (02/06)

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RPP-RPT-29447, Rev. 0

Independent Qualified Registered Professional Engineer Installation Assessment Report for the Integrated Disposal Facility (IDF) Leachate Tank System (Cell 1)

Prepared for H.L. Baune
CH2M HILL Hanford Group, Inc.
Richland, WA 99352
U.S. Department of Energy Contract DE-AC27-99RL14047

EDT/ECN:	EDT-822281	UC:	
Cost Center:		Charge Code:	
B&R Code:		Total Pages:	35

Key Words: IDF, Integrated, Disposal, Facility, IQRPE, Independent, Qualified, Professional, Registered, Engineer, Installation, Cell 1, Tank, Leachate, WAC.

Abstract: This IQRPE Installation Assessment Report certifies the IDF Leachate Tank System (Cell 1) including all secondary containment design features was correctly installed and meets the requirements of Washington Administrative Code (WAC) 173-303-640 (3) and (4).

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A-6002-767 (03/01)

Independent Qualified Registered Professional Engineer Installation Assessment Report For The Integrated Disposal Facility (IDF) Leachate Tank System (Cell 1)

CH2M HILL Requisition No. 116229

IQRPE Installation Assessment Report No. IR-102, Rev. 0

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October 24, 2006

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1.0 INTRODUCTION

The Hanford Integrated Disposal Facility (IDF) Cell 1 will provide the capability for near-surface disposal of Immobilized Low-Activity Waste (ILAW) waste packages (mixed waste from the River Protection Project—Waste Treatment Plant and the Demonstration Bulk Vitrification System). Cell 1 will also provide disposal of waste generated from IDF operations.

The IDF is located in southeastern Washington State on the Hanford site in the 200 East area (See Figure 1). The IDF is essential to the U.S. Department of Energy-Office of River Protection (DOE-ORP) mission to store, retrieve, treat, and dispose of the radioactive Hanford tank waste in an environmentally sound, safe, and cost-effective manner.

The Washington State Department of Ecology (Ecology) has issued the final "Hanford Facility Resource Conservation and Recovery Act (RCRA) Permit for the Treatment, Storage, and Disposal of Dangerous Waste (WA7890008967) Part III, Operating Unit 11, Unit-Specific Permit Conditions for the Integrated Disposal Facility."

"IQRPE Design Assessment Report DR-101, Rev. 0 (RPP-RPT-25837)" provides the Independent, Qualified, Registered Professional Engineer (IQRPE) design assessment. TechnoGeneral Services Company (TGS) has prepared this IQRPE Installation Report at the request of CH2M HILL Hanford Group, Inc (CHG). TGS is the IQRPE of record for this project.

1.1 Purpose

The purpose of this report is to certify that the IDF Leachate Tank System (Cell 1) including all secondary containment design features, hereafter known as the Leachate Tank System, was correctly installed and meets the requirements of Washington Administrative Code (WAC) 173-303-640 (3) and (4).

1.2 Scope

The design and installation for the Leachate Tank System in TGS "IQRPE Report DR-101, Rev. 0" and this report have been assessed. The tank system installation activities have been independently witnessed and reviewed prior to the backfilling of any relevant tank components to ensure that there are no:

- Weld breaks,
- Punctures,
- Damage to protective coatings,
- Cracks, or
- Other structural damage or inadequate construction/installation.

Pipeline 219A201-2"-LTCP-036 was buried prior to IQRPE inspection; however, a review of construction records indicate this pipeline was adequately installed.

The scope includes the verification of proper installation (compliance with the design and specifications) and required acceptance testing of the following including secondary containment design items:

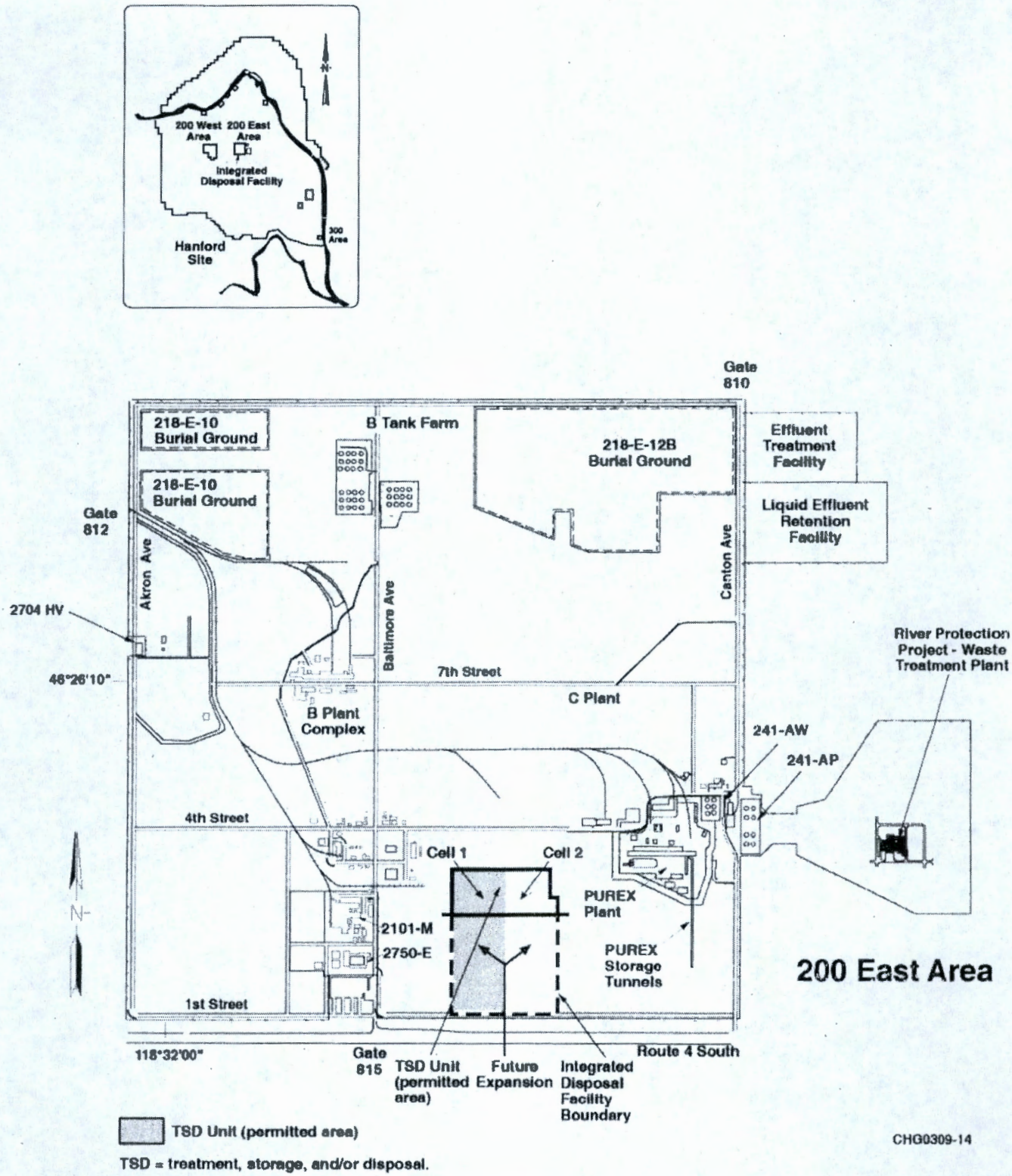
- High-density polyethylene (HDPE) underground transfer pipelines (including applicable Leachate Collection and Removal [LCRS], Leak Detection System [LDS] and Secondary Leak Detection System [SLDS] items),
- Crest Pad Building foundation, sump, and ancillary equipment,
- Combined Sump and ancillary equipment,
- Leachate 90-day Accumulation Tank,
- Leachate Transfer Building foundation, sump, and ancillary equipment,
- Truck Loading Station foundation, sumps, and ancillary equipment.

As-built drawings of the major components of the Leachate Tank System are shown in Figures 2 through 5 and are referenced in the report sections as applicable.

Inspections during construction were performed with the guidance of the "IQRPE Inspection Plan Report IP-101, Rev. 0 (RPP-PLAN-26730)."

Utilities, such as water, electrical and lights, are not included in this certification.

A cathodic protection system was not required in the design.



TSD = treatment, storage, and/or disposal.

Figure 1. Integrated Disposal Facility Location

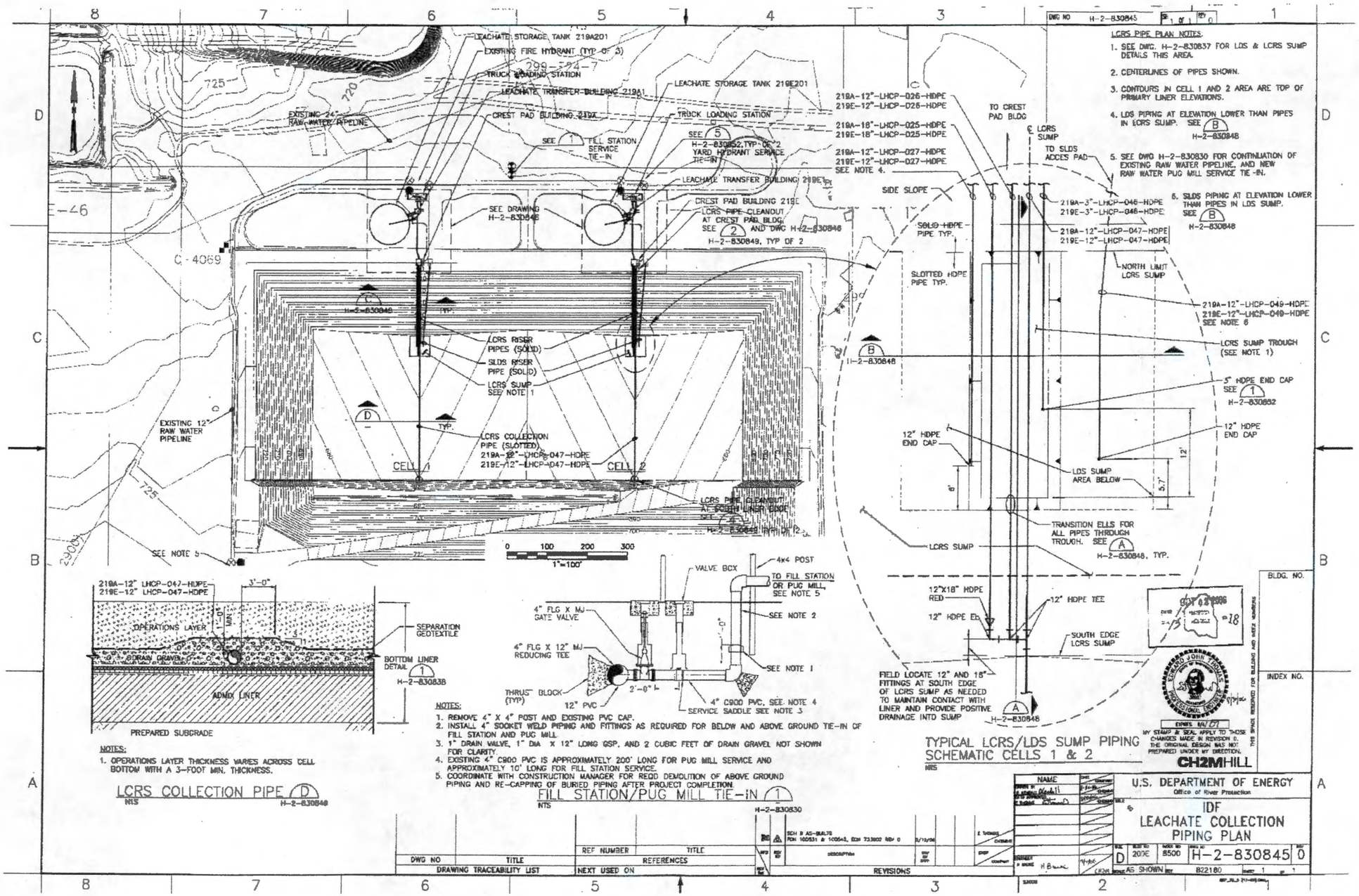


Figure 2. As-Built - IDF Leachate Collection Piping Plan

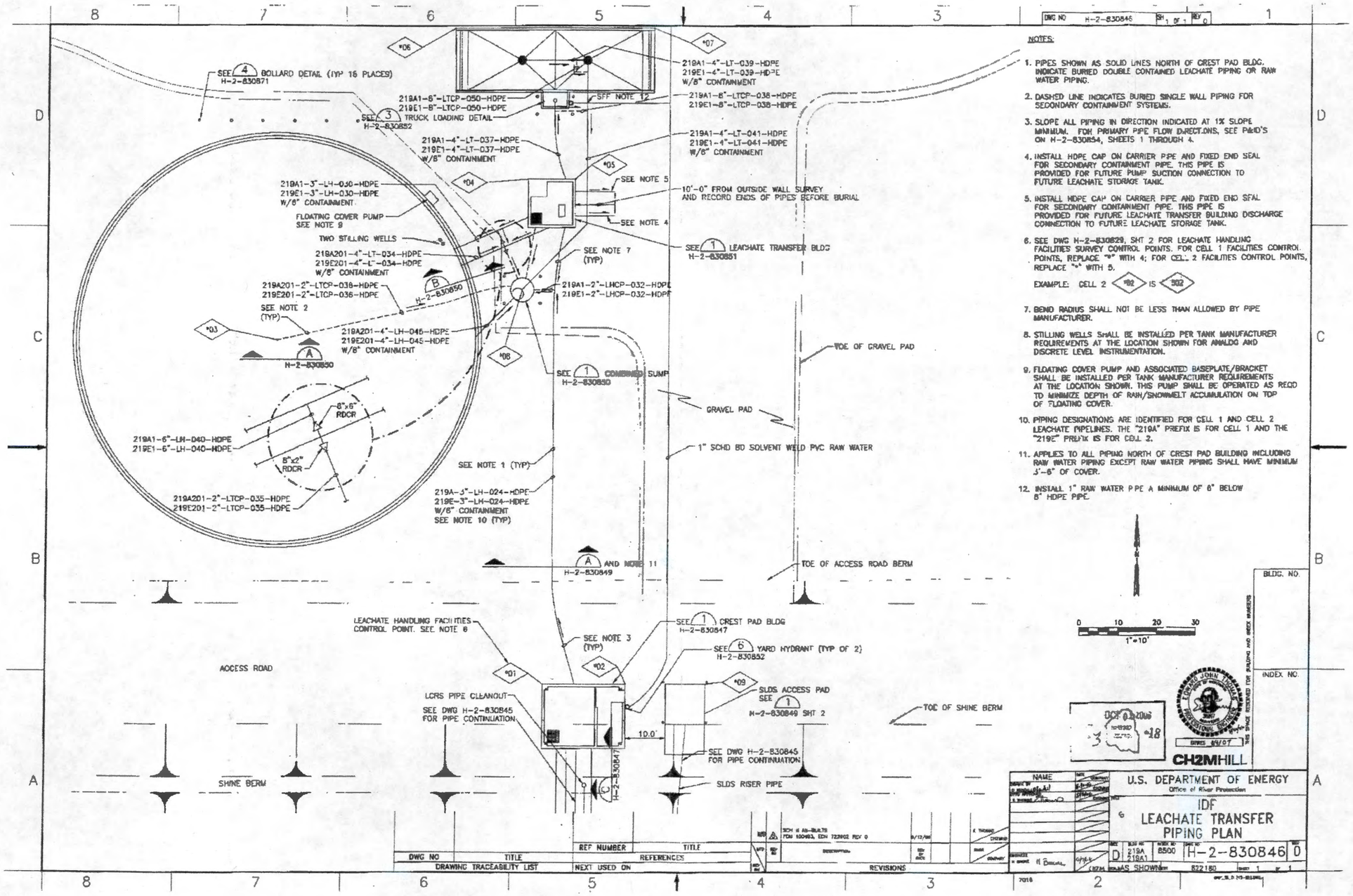


Figure 3. As-Built - IDF Leachate Transfer Piping Plan

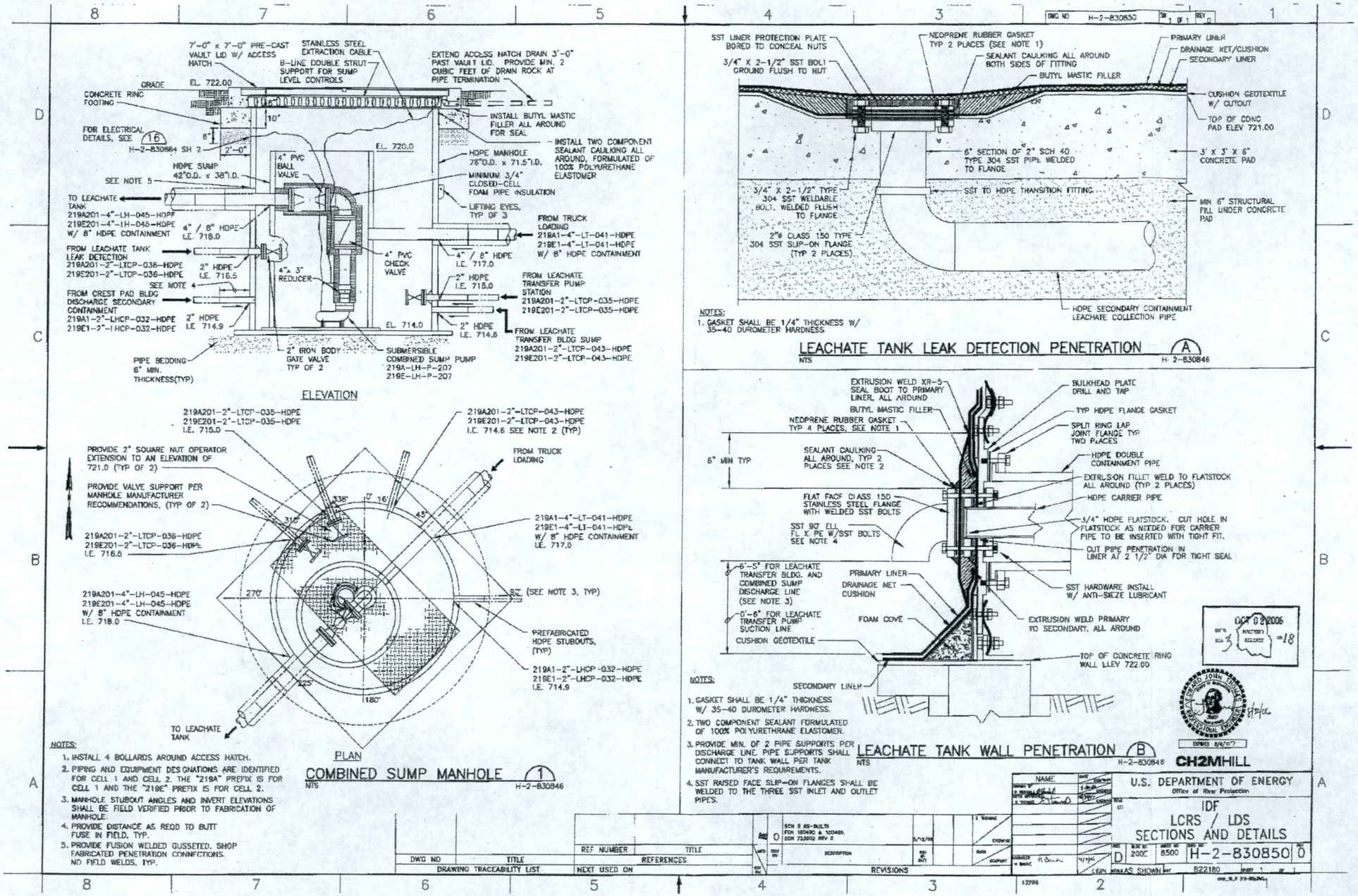


Figure 4. As-Built - Combined Sump and Leachate Tank Liner Penetration Details

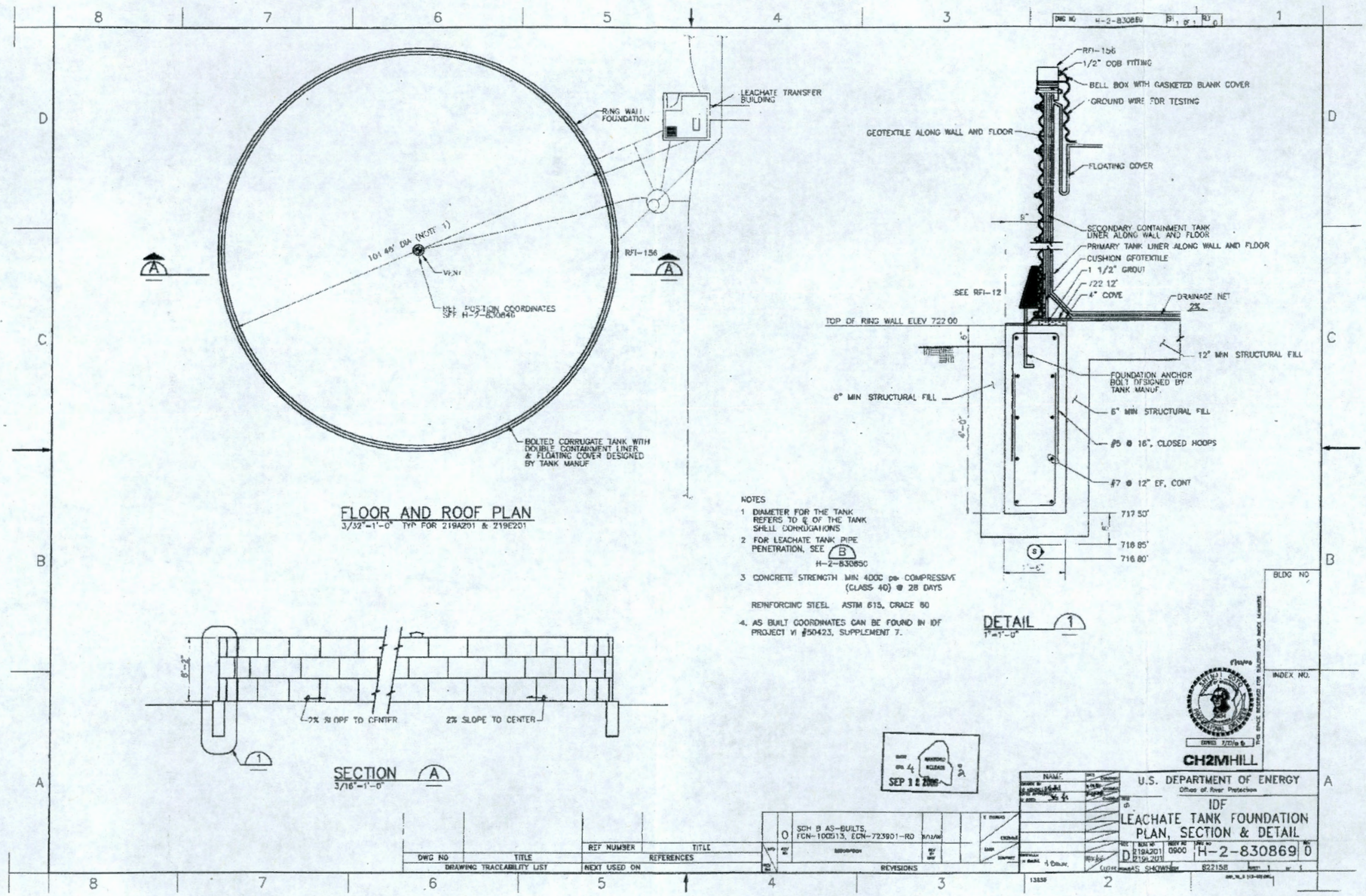


Figure 5. As-Built - IDF Leachate Tank Foundation and Structure

2.0 INSTALLATION AND TIGHTNESS ASSESSMENT

The Leachate Tank System includes the following major components for IQRPE installation certification:

- HDPE Underground Transfer Pipelines (including piping and pumps for the LCRS, the LDS and the SLDS piping)
- Crest Pad Building (including the foundation and sump) and Ancillary Equipment
  - Winch and support stands
  - Sump pump
  - Valves, leak detection elements and switches, flow meters, pressure sensors, and polyvinyl chloride (PVC) pipelines and associated supports necessary for the leachate transfer through the Crest Pad Building.
- Combined Sump and Ancillary Equipment
  - Inner HDPE manhole (leak detection chamber)
  - Outer sump
  - Submersible pumps
  - Valves
  - Level switches (including instrumentation and control)
- Leachate 90-Day Accumulation Tank (foundation, steel tank structure, primary and secondary liner, floating cover and water removal pump, tank inlet/outlet pipe penetrations [including above grade HDPE pipes and heat trace])
- Leachate Transfer Building (including the foundation and sump) and Ancillary Equipment
  - Leachate pump
  - Valves, flow meters, PVC pipelines and associated supports necessary for the leachate transfer through the Leachate Transfer Building.
- Truck Loading Station and Ancillary Equipment
  - Foundation
  - Sumps and sump covers
  - Upright Truck Loading Connection (including structure, piping, associated valves and heat trace)

Vendor submittals identified in the "IQRPE Inspection Plan Report IP-101, Rev. 0 (RPP-PLAN-26730)" have been reviewed and found adequate for tank installation certification. The project field change notice (FCN) and engineering change notice (ECN) logs were reviewed periodically during installation and any FCNs or ECNs impacting the IQRPE scope were reviewed. The IQRPE has determined that all FCNs and ECNs reviewed show that the installation meets the requirements of WAC 173-303-640.

Table 1 contains a list of the IQRPE Inspection Reports. The records required for inspection activities were previously identified in the inspection plan and many of these records document system tightness after installation and prior to service. TGS provided the completed inspection reports to CHG as they were generated during the construction installation and testing activities. WAC 173-303-640 (3) (h) requires that the IQRPE Inspection Reports be included in the Operating Record and kept at the facility. CHG will maintain copies of the IQRPE Inspection Reports in the Operating Record in accordance with the guidance in Ecology Publication 94-114.

All pipeline pressure testing was completed as sections were installed and prior to being covered. The proper placement and backfill of underground components was confirmed with the review of available construction records and verified through discussions with the DelHur Quality Assurance Manager and the CHG Construction Field Engineer.

All component construction acceptance tests (CCATs) and system construction acceptance tests (SCATs) documented in DelHur 2006a were reviewed by TGS and found to be acceptable. The Title III Engineer's technical memorandum, "IDF Cell 1 and 2 Tanks – Acceptance Criteria and Re-Certification Recommendations", and the contractor's "Tanks Installation Inspection Report", were reviewed and the IQRPE concurs with the data documented in these reports.

The IQRPE concurs with the Design Agent's recommendations for inspection intervals as given in the IDF Critical Systems Design Report. This includes incorporating vendor-recommended inspections and maintenance for ancillary equipment into operations procedures. The need for additional periodic inspections will be determined by the Owner/Operator in accordance with WAC 173-303-640(6).

TGS IQRPE inspections were performed by F. Ray Vollert, PE, TGS; Chris Mitchell, CWI, ISI Inspections; and Roger Webb, PE, PRL Enterprises, LLC. All TGS IQRPE Inspection Reports were reviewed and approved by Robert L. Goodman, Jr., PE, TGS Chief Engineer.

Table 1. TGS IQRPE Installation Inspection Reports

INSPECTION REPORT	SUMMARY	COMPONENT INSPECTED
LCRS & LDS		
I-PIPE-008	Insertion Tests	-- 219A-18"-LHCP-025-HDPE -- 219A-12"-LHCP-026-HDPE -- 219A-3"-LHCP-048-HDPE
I-PIPE-010	Pneumatic Tests of Riser Extension Joints	-- 219A-12"-LHCP-026-HDPE -- 219A-12"-LHCP-027-HDPE -- 219A-12"-LHCP-047-HDPE -- 219A-3"-LH-048-HDPE
I-PIPE-012	Pneumatic Tests of Riser Extension Joints and Inner Sump Hydrostatic Test	219A-18"-LHCP-025-HDPE
I-PIPE-014	Hydrostatic Tests, LCRS Low-Flow and LDS Piping (both cells)	-- 219A-1.5"-LH-009-HDPE -- 219A-1.5"-LH-015-HDPE
I-PIPE-015	High-Flow LCRS Piping Hydrostatic Test (both cells)	219A-3"-LH-001-HDPE
I-PIPE-019	LCRS and LDS Pump CCATs (both cells)	-- 219A-LH-P-202 -- 219A-LH-P-203 -- 219A-LH-P-204
I-PIPE-020	LCRS and LDS Pump Insertion Tests	-- 219A-LH-P-202 -- 219A-LH-P-203 -- 219A-LH-P-204
I-PIPE-024	LCRS Low-flow and LDS 1 ½ in. Transfer Pipe Hydrostatic Test (both cells)	-- 219A-1.5"-LH-009-HDPE -- 219A-1.5"-LH-015-HDPE

INSPECTION REPORT	SUMMARY	COMPONENT INSPECTED
SLDS		
I-FDN-037	Forms, Reinforcing, and Concrete Placement	SLDS Splash Pads
HDPE Transfer Piping		
I-PIPE-001	HDPE Fusion Welding (both cells)	Initial review of HDPE pipe welding equipment and processes
I-PIPE-007	Pneumatic Tests	-- 219A201-2"-LTCP-036-HDPE -- 219A-12"-LHCP-026-HDPE -- 219A-12"-LHCP-047-HDPE -- 219A-18"-LHCP-025-HDPE -- 219A-3"-LHCP-048-HDPE

INSPECTION REPORT	SUMMARY	COMPONENT INSPECTED
I-PIPE-011	Pneumatic and Hydrostatic Tests & Cell 1 Combined Sump (hydrostatic only)	-- 219A1-4"-LT-037-HDPE (carrier) -- 219A201-2"-LTCP-043-HDPE (cont.) -- 219A1-4"-LT-039-HDPE (carrier) -- 219A1-4"-LT-041-HDPE (carrier) -- 219A1-4"-LT-037-HDPE (cont.) -- 219A1-4"-LT-039-HDPE (cont.) -- 219A1-4"-LT-041-HDPE (cont.) -- 219A1-8"-LTCP-038-HDPE (cont.) -- 219A1-8"-LTCP-050-HDPE (cont.) -- 219A1-3"-LH-030-HDPE (carrier) -- 219A201-4"-LT-034-HDPE (carrier) -- 219A1-3"-LH-030-HDPE (cont.) -- 219A1-4"-LT-034-HDPE (cont.) -- 219A1-6"-LH-040-HDPE (cont.) -- 219A201-2"-LTCP-035-HDPE (cont.) -- future pump suction (3" carrier) -- future discharge (4" carrier) -- future pump suction (6" cont.) -- future discharge (8" cont.) -- 219A201-4"-LH-045-HDPE (carrier) -- 219A201-4"-LH-045-HDPE (cont.) -- 219A-3"-LH-024-HDPE (carrier) -- 219A-3"-LH-024-HDPE (cont.) -- 219A1-2"-LHCP-032-HDPE (cont.)

INSPECTION REPORT	SUMMARY	COMPONENT INSPECTED
Crest Pad Building		
I-FDN-018	Forms and Reinforcing	Crest Pad Building (sump base slab)
I-FDN-019	Concrete Placement (both cells)	Crest Pad Building (sump base slab)
I-FDN-022	Forms and Reinforcing	Crest Pad Building (sump base slab)
I-FDN-023	Concrete Placement	Crest Pad Building (sump base slab)
I-FDN-028	Forms and Reinforcing	Crest Pad Building (sump walls)
I-FDN-030	Concrete Placement	Crest Pad Building (sump walls)
I-FDN-033	Forms and Reinforcing	Crest Pad Building (foundation)
I-FDN-034	Concrete Placement	Crest Pad Building (foundation)
I-FDN-035	Forms and Reinforcing	Crest Pad Building (walls and curbs)
I-FDN-036	Concrete Placement	Crest Pad Building (walls and curbs)
I-FDN-038	Coating Adhesion Pull off Test	Crest Pad Building concrete coating
I-PIPE-018	Hydrostatic Testing of PVC Ancillary Pipe and Functional Valve Testing	Crest Pad Building ancillary equipment (PVC piping and valves)
I-PIPE-025	Tightness Testing	Crest Pad Building (sump)
Combined Sump		
I-PIPE-011	Pneumatic and Hydrostatic Tests & Cell 1 Combined Sump (hydrostatic only)	219A-LH-M-207
I-PIPE-012	Pneumatic Tests of Riser Extension Joints and Inner Sump Hydrostatic Test	219A-LH-M-207
I-PIPE-023	Combined Sump Pump Operational Test (both cells); CAT-PC-207-A	219A-LH-P-207
Leachate Transfer Building		
I-FDN-018	Forms and Reinforcing	Leachate Transfer Building (sump base slab)

INSPECTION REPORT	SUMMARY	COMPONENT INSPECTED
I-FDN-019	Concrete Placement	Leachate Transfer Building (sump base slab)
I-FDN-024	Forms and Reinforcing	Leachate Transfer Building (foundation)
I-FDN-025	Concrete Placement	Leachate Transfer Building (foundation)
I-FDN-029	Forms and Reinforcing	Leachate Transfer Building (curbs)
I-FDN-030	Concrete Placement	Leachate Transfer Building (curbs)
I-FDN-038	Coating Adhesion Pull off Test	Leachate Transfer Building concrete coating
I-PIPE-018	Hydrostatic Testing of PVC Ancillary Pipe and Functional Valve Testing	Leachate Transfer Building ancillary equipment (PVC piping and valves)
I-PIPE-023	Leachate Transfer Pump Operational Test; CAT-PC-302-A	219A-LH-P-302
I-PIPE-025	Tightness Testing	Leachate Transfer Building (sump)
Leachate 90-Day Accumulation Tank		
I-FDN-010	Forms and Reinforcing	Leachate Tank (foundation)
I-FDN-011	Concrete Placement	Leachate Tank (foundation)
I-PIPE-021	Pneumatic and Hydrostatic Tests	-- 219A1-3"-LH-030-HDPE (w/ 6" containment) -- 219A201-4"-LT-034-HDPE (w/ 8" containment) -- 219A201-4"-LH-045-HDPE (w/ 8" containment)
I-TK-001	Leachate Tank Shell Assembly (both cells)	Cell 1 Leachate Tank
I-TK-002	Secondary Liner Installation and Leak Tests (both cells)	Cell 1 Leachate Tank
I-TK-003	Primary Liner Installation and Leak Tests (both cells)	Cell 1 Leachate Tank
I-TK-004	30-Day Tightness Tests (Cell 1 and Cell 2)	Cell 1 Leachate Tank

INSPECTION REPORT	SUMMARY	COMPONENT INSPECTED
Truck Loading Station		
I-FDN-008	Forms and Reinforcing	Truck Loading Station (sump base slabs)
I-FDN-009	Concrete Placement	Truck Loading Station (sump base slabs)
I-FDN-014	Forms and Reinforcement	Truck Loading Station (sump walls)
I-FDN-015	Concrete Placement	Truck Loading Station (sump walls)
I-FDN-020	Forms and Reinforcing	Truck Loading Station (foundation)
I-FDN-021	Concrete Placement	Truck Loading Station (foundation)
I-FDN-029	Forms and Reinforcing	Truck Loading Station (curbs)
I-FDN-030	Concrete Placement	Truck Loading Station (curbs)
I-FDN-031	Forms and Reinforcing	Truck Loading Station (upright connection structure & perimeter curbs)
I-FDN-032	Concrete Placement	Truck Loading Station (upright connection structure & perimeter curbs)
I-FDN-038	Coating Adhesion Pull off Test	Truck Loading Station foundation concrete coating
I-PIPE-016	Hydrostatic Testing	Truck Loading Station (galvanized steel pipe and V-036, V037)
I-WELD-002	Weld Evaluation	Truck Loading Station (upright connection structure)

2.1 HDPE Underground Transfer Pipe

HDPE pipe is used for the underground leachate pipelines (see Figures 2 and 3). The out-of-cell transfer lines are double-walled with integrated centralizers. The LCRS, LDS, and SLDS lines are single-walled pipe. These are smaller diameter 8 ft. lengths of pipe connected by cam-lock quick-connections. For double containment, these are installed and operated inside larger diameter pipelines.

The installation process included certified quality assurance (CQA) receipt inspection of all HDPE pipe related items to ensure conformance with the Construction Specifications. TGS reviewed the material certification submittals and confirms that the HDPE resin, from which the

pipe is made, meets the requirements of ASTM D3350 for PE3408 material with a cell classification of 34543C as called for in the Construction Specifications. On the construction site, certified HDPE welding technicians were used for fabrication (IDF submittal #172). A McElroy© (Model 28) self-contained electric hydraulic fusion machine was used for all HDPE welding. TGS concludes that the contractor had the equipment and capabilities to reliably weld double and single wall HDPE piping with acceptable quality.

Pipeline trenches were prepared according to the Construction Specification, including adequate bedding and compaction to prevent subsidence and pipeline physical damage. Pipelines were generally fabricated at the construction site and located at the appropriate place and slope as specified in the design. Due to the size and length, the LCRS (containment pipes), LDS (containment pipes), and SLDS pipelines were fabricated at the trench crest and then placed into position utilizing crawler backhoes with nylon slings, a forklift, and manpower. During the cover process for the SLDS pipe, heavy equipment damaged a portion of the pipe that exceeded that allowed in the Construction Specifications. The section of the pipe that was damaged was replaced (NCR-005).

All HDPE pipelines (with one exception) were pressure (leakage) tested according to the Construction Specifications. The carrier pipelines were hydrostatically pressure tested, and containment pipelines were pneumatic pressure tested. All pipeline pressure testing was done as sections were installed and prior to covering, since the Leachate Tank System is not designed for post-installation pipeline pressure testing. The exception identified by request for information (RFI) #125 allows for visual inspection in lieu of pneumatic testing for 1 vertical weld and 1 horizontal weld on the -045 containment line at the tank tie-in. For Cell 1, the one weld connecting the elbow and horizontal portion to the tank was only visually inspected. All other welds in the -045 line were pressure (leakage) tested according to the Construction Specifications.

Liquid bubble examination for leaks during the pneumatic pressure tests for some of the SLDS and LDS containment piping was not performed. This resulted from interpretation of the Construction Specification that liquid bubble testing was only necessary if a drop in pressure below 5% was seen during the test interval. NCR-07 provides acceptable disposition for these cases.

All above ground portions of HDPE pipeline (i.e., at the tank and the Truck Loading Station) are wrapped with heat trace and well insulated and protected from freezing and to limit pipe thermal differential expansion and the associated stresses. Additionally, the above ground sections of HDPE pipeline have substantial pipe supports. Although design calculations were not performed, it is the professional judgment of the IQRPE from the evaluation of inspections that the pipe supports are sufficient to resist design earthquake forces.

Pipelines have been labeled.

Table 1 includes the inspection records for all HDPE transfer pipelines.

Based on site inspections, and the review of available construction records and related vendor submittals, TGS concludes that HDPE pipelines are located according to the design, have been adequately installed, and passed tightness testing to ensure their WAC-related functions, as evaluated in the design assessment report.

2.2 Crest Pad Building and Ancillary Equipment

Table 1 includes the inspection records for the Crest Pad Building and ancillary equipment.

2.2.1 Crest Pad Building (including foundation, sump, curbs and walls)

Review of subgrade moisture content and density construction records indicate that the foundation subgrade was prepared in accordance with the Construction Specifications. The reinforced concrete sump, foundation slab, walls, and curbs were sequentially placed as required by the design. The design required water-stops are installed at construction joints. LinkSeal® mechanical sleeves are installed for the HDPE pipe penetrations through the concrete walls and foundation slab (including the 219A-3"-LH-024-HDPE pipeline to the Leachate Transfer Building). Concrete for the reinforced walls was placed using a mobile concrete pump truck. Concrete surfaces were coated and tested in accordance with the Construction Specifications. Construction Specification 9900 called for Ameron coating systems or approved substitutes. The project approved an alternative, Carboline coating systems, which was used for all concrete coatings identified by drawings. The exterior exposed concrete of the walls was coated as required by the dispositions of NCR-011. TGS reviewed the building installation certification submittal and concludes that the building was installed as designed and meets the Construction Specification requirements.

Components have been labeled with identification numbers. However, at this time, signage is not in place to meet WAC-173-303-640 (5) (d) since IDF will not be used for disposal of waste in the immediate future. The management of non-leachate precipitation water does not require WAC signage.

Based on site inspections and the review of available construction records and related vendor submittals, TGS concludes that the Crest Pad Building passed tightness testing and is adequately installed to meet its WAC-related functions, as evaluated in the design assessment report.

2.2.2 Crest Pad Building Ancillary Equipment

The flexible hoses, PVC pipelines and valves (including piping supports), level transducers (219A1-LH-LT-101 [LCRS] and -104 [LDS]), leachate filter, sump pump (219A1-LH-P-205) and associated leak detection elements and switches and power panels are installed correctly. Review of process instrumentation and control system (PICS) submittals indicates that the PICS is calibrated and will function correctly. The required SCATs were successfully completed.

The sump pump passed acceptance testing. The PVC pipelines and flexible hoses have been hydrostatically pressure tested in accordance with the Construction Specifications. The associated valves have been functionally tested. The pipe supports are installed appropriately. The Crest Pad Building instrument and control system has been calibrated and passed acceptance testing.

TGS has reviewed the design changes for the winch stands and concurs that the design is structurally adequate. The welding procedure specification (WPS), welding procedure qualification (WPQ), and performance qualification requirements (PQR) associated with the winch stand welds has been reviewed and found to be acceptable. The fabricated winch stands have been visually inspected and are adequate. It is noted that the winch gearing for the winch to remove 219A1-LH-P-203 requires 20 crank rotations for every one rotation of the winch drum. Hand cranking over twenty-seven 8-ft sections will take a long time and may not be ergonomically friendly. A variable speed electric drive for the pump removal was used in the insertion/extraction CAT. It is evident that the high-flow pump winch post will need to be absent during LDS pump insertion and extraction to provide the operator access to the winch handle.

The insertion/extraction CATs results were reviewed for 219A1-LH-P-202 (LCRS low-flow), 219A1-LH-P-203 (LCRS high-flow) and 219A1-LH-P-204 (LDS). Manual, physical force was required to insert the low-flow and LDS pumps due to the spool memory retention of the 1 ½ in. pipe lengths (when assembled, the pipe run took on a sinusoidal shape which affected insertion). The 1 ½ in. pipe lengths were replaced using straight stock (not spooled) and hydrostatic pressure tested. A repeat insertion/extraction test was deemed unnecessary.

The LCRS pumps and level transducer (219A1-LH-LT-101) in 219A-18"-LHCP-025-HDPE, and LDS pump and level transducer (219A1-LH-LT-104) in 219A-12"-LHCP-027-HDPE are also considered to be ancillary equipment. The pumps and level transducers are adequately installed and have passed the required acceptance testing.

The SLDS reinforced concrete monolith was placed and utilizes a LinkSeal® mechanical sleeve as a wall penetration for the 219A-12"-LHCP-049-HDPE pipeline. The SLDS level transducer, 219A1-LH-LT-101, has been installed and connected to the associated instrumentation station. Acceptance testing shows the system is installed correctly and functions as designed.

Crest Pad Building control panel problems were experienced during the CAT and were most likely due to dust in the electrical panels, possibly from sand blasting the concrete in preparation for the surface coating. The ventilation damper was modified to add a filter and an associated housing unit inside the building to prevent wind-borne sand and dust from entering the building.

An auto-dialer was added to the control panel to support the Care and Custody Phase. Components have been labeled with identification numbers.

Based on site inspections, and the review of available construction records and related vendor submittals, TGS concludes that the Crest Pad Building ancillary equipment is adequately

installed and passed tightness testing to meet its WAC-related functions, as evaluated in the design assessment report.

2.3 Combined Sump and Ancillary Equipment

Table 1 includes the inspection records for the Combined Sump and ancillary equipment (see Figure 4).

2.3.1 Combined Sump

TGS reviewed the material certification submittals and confirms that the HDPE resin, from which the inner and outer manholes were made from, meets the requirements of ASTM D3350 for PE3408 material with a cell classification of 34543C as called for in the Construction Specifications. TGS observed installation of the Combined Sump (including HDPE pipe connections, ring footing placement, outer french drain construction and lid placement) during numerous site visits. The Combined Sump (both inner and outer manholes) was hydrostatically tested successfully as required in the component CAT.

Components have been labeled with identification numbers. However, at this time, signage is not in place to meet WAC-173-303-640 (5) (d) since IDF will not be used for disposal of waste in the near future. The management of non-leachate precipitation water does not require WAC signage.

Based on site inspections, and the review of available construction records and related vendor submittals, TGS concludes that the Combined Sump is adequately installed and passed tightness testing to meet its WAC-related functions, as evaluated in the design assessment report.

2.3.2 Combined Sump Ancillary Equipment

The leachate handling pump (219A1-LH-P-207), level sensors, and valves (and their supports) have been installed and passed acceptance testing. The integrated check valve (CV-030) in P-207 was modified in the field to include a counter-weight kit. The counter-weight kit increases the reliability for closing the check valve. Functional testing of all valves has been completed. TGS confirmed that two 6 ft long T-handled operating wrenches for 2 in. square nut operations for V-038 and V-039 were present. The Operations group will provide a small portable contractor-type pump to remove fluid from the outer portion of the Combined Sump, as required.

Components have been labeled with identification numbers.

Based on site inspections, and the review of available construction records and related vendor submittals, TGS concludes that the Combined Sump ancillary equipment is adequately installed and passed tightness testing to meet its WAC-related functions, as evaluated in the design assessment report.

2.4 Leachate 90-Day Accumulation Tank

Table 1 includes the inspection records for the Leachate 90-Day Accumulation Tank (see Figures 4 and 5).

Review of subgrade moisture content and density construction records indicate that the tank ringwall foundation subgrade was prepared in accordance with the Construction Specifications. Pipeline 219A201-2"-LTCP-036-HDPE (from the center of the tank to the Combined Sump) runs under the ringwall foundation. The concrete flange adapter is installed according to design. Construction records verify the slope of this pipeline from the center of the tank to the Combined Sump. It was pneumatic pressure tested. The entire reinforced concrete ringwall foundation was monolithically placed using a mobile concrete pump truck. After curing according the Construction Specifications, the concrete forms were removed. The excavations inside and outside of the ringwall foundation were backfilled. The top grade inside the tank was compacted and sloped towards the center as required.

The tank shell (including the wind girder) was installed according to the design and Construction Specifications. Bolts for the bottom of the shell to the ringwall foundation were field located, drilled and installed with epoxy.

Geotextile material was installed against all inside surfaces of the tank shell to buffer the secondary liner from the bolted sheet metal panels. Four-inch non-compressive foam was installed around the perimeter as a cove to avoid liner pinching at the corner. The secondary liner is affixed to the tank center flange adapter per design. Also, the secondary liner was installed per design at the other tank penetrations (lines -030, -034, and -045).

Initial installation of the secondary liner was done from mid-November to January. The liner was affected by winter weather. Some tightness problems with the secondary liner were identified and documented in NCR-013. The original secondary liner was replaced with the original primary liner and a new primary liner was ordered for installation. Changes to field installation instructions directed by the disposition of NCR-013 included utilizing only lyster welds (no additional extrusion welding) and applying at least 2 coats of a liquid sealant (PM-100) on all field welds. Other non-destructive tests utilized for the secondary liner inspection included visual (both with a pick-tool and back-light), air jet, vacuum box, electronic leak location, and liquid dye. The "new" secondary liner underwent a fugitive liquid dye test after leaks (which had been identified by the electronic leak location testing) were repaired. NCR-015 was generated after a leak, located directly below the line -030 penetration, was found by the liquid dye test. NCR-015 was closed by leak location identification, repair, and retest with liquid dye.

The primary liner was installed per design at the tank penetrations (lines -030, -034, and -045). 90° stainless steel elbows were installed as required for each of these penetrations. Non-destructive tests utilized for the primary liner inspection included visual (both with a pick-tool and back-light), air jet, vacuum box, and electronic leak location. The water with liquid dye between the primary and secondary liners was drained to the Combined Sump through the -036 pipeline under the hydrostatic pressure from a filled tank. The flow volume measurements and

calculated rates were periodically graphed. The purpose was to confirm primary liner tightness by showing that drainage from between the liners diminished and became negligible. However, water drainage from between the liners persisted for more than 3 weeks, delaying primary liner tightness confirmation. An additional electronic leak detection survey was performed on the primary liner. Thirteen potential locations were identified on the tank floor (and one on the Cove weld) for a total of 14 potential locations. After the electronic survey, approximately 300 gallons of dye water was added into the annulus. The water level in the annulus was raised approximately 2 in. above the tank water level to create a head difference to identify potential leak pathways around the lower penetration. Observations were conducted for about 40 minutes and no dye was observed on the inside of the tank. The tank was drained and each potential defect was repaired using liquid XR-5, and thermal welding per the Construction Specification.

NCR No. 016 provides a Delhur Industries Project Inspection Report that documents the disposition and subsequent repairs of the primary liner. The IQRPE concurs with NCR No. 016 that the lower penetration is acceptable based on the results of the previous investigations.

The cover, stilling well, and its instrumentation were installed and tested per design and Construction Specifications and passed. Review of PICS submittals indicates that it is calibrated correctly. Due to interstitial water remaining between the primary and secondary liners that resulted from the primary liner electronic leak test, the CAT leak rate acceptance criteria for the primary liner was modified from a value of no leaks to a value of 2 oz / hour. The tank passed the 30-day tightness CAT.

Components have been labeled with identification numbers. However, at this time, signage is not in place to meet WAC-173-303-640 (5) (d) since IDF will not be used for disposal of waste in the near future. The management of non-leachate precipitation water does not require WAC signage.

Based on site inspections, and the review of available construction records and related vendor submittals, TGS concludes that the Leachate 90-Day Accumulation Tank passed tightness testing and is adequately installed to meet its WAC-related functions, as evaluated in the design assessment report. The IQRPE recommends primary and secondary liner tightness tests at the end of the Care and Custody Phase to confirm tank integrity prior to the start of dangerous waste tank system operations.

2.5 Leachate Transfer Building and Ancillary Equipment

Table 1 includes the inspection records for the Leachate Transfer Building and ancillary equipment.

2.5.1 Leachate Transfer Building (including foundation and sump)

Review of subgrade moisture content and density construction records indicate that the foundation subgrade was prepared according to the Construction Specifications. The reinforced

concrete sump, foundation slab, walls, and curbs were sequentially placed as required by the design. The design required water-stops are installed at construction joints. LinkSeal® mechanical sleeves are installed for all the HDPE pipe penetrations through the concrete foundation slab. Concrete surfaces were coated and tested in accordance with the Construction Specification. Review of the building installation certification submittal shows that it was installed as designed.

Components have been labeled with identification numbers. However, at this time, signage is not in place to meet WAC-173-303-640 (5) (d) since IDF will not be used for disposal of waste in the near future. The management of non-leachate precipitation water does not require WAC signage.

Based on site inspections, and the review of available construction records and related vendor submittals, TGS concludes that the Leachate Transfer Building is adequately installed and passed tightness testing to meet its WAC-related functions, as evaluated in the design assessment report.

2.5.2 Leachate Transfer Building Ancillary Equipment

PVC pipelines, valves (including pipe supports), and the leachate transfer pump (219A1-LH-P-302) is installed correctly. Review of process instrumentation and control system (PICS) submittals indicates that the PICS is calibrated correctly.

The leachate transfer pump has passed acceptance testing. The PVC pipelines have been hydrostatic pressure tested in accordance with the Construction Specifications. The associated valves have been functionally tested. The associated instrument and control equipment has been calibrated and passed acceptance testing. According to design, two double-walled blanked off pipelines have been installed and pressure tested. The blank pipelines are for connection to a potential future leachate tank.

The SCAT for the leachate transfer pump (SCAT-P-302-A) found a possible backup flow situation at the Truck Loading Station in the design. The Leachate Tank System is designed so that in the event there is a 250 gpm (design flow capacity of P-302) overflow situation at the Truck Loading Station, the overflow will be contained in the Truck Loading Station foundation and directed to the 2 sumps. Overflow liquid then gravity flows from the Truck Loading Station sumps in lines 219A1-4"-LT-039 and 219A1-4"-LT-041 to the Combined Sump where P-207 (design flow capacity is 250 gpm) will pump the overflow back into the Leachate 90-Day Accumulation Tank. The SCATs determine P-302 (leachate transfer pump) flow capacity, with all valves in the transfer path full open, to be between 279 and 301 gpm. SCATs report P-207 (Combined Sump Pump) flow capacity to be 279 – 292 gpm. However, it was determined that the gravity flow from the Truck Loading Station to the Combined Sump is about 168 gpm maximum. A second test determined that backup of P-302 causing fluid overflow onto the Truck Loading Station pad is likely to begin in 10 to 20 minutes. P-302 is manually operated (a power kill switch is near by) and V-029 or V-037 can be used to manually throttle flow to the Truck Loading Station. The IQRPE believes that an operator is required to be present at the Truck Loading Station 100% of the time during transfers of fluid from the Leachate 90-Day

Accumulation Tank to a truck. The reason is to prevent the possibility of overflowing the Truck Loading Station foundation and permitting fluid leakage to bare ground. Operation Instruction IDF-161-704, "Leachate Storage Tank and Transfer System Operation Instruction", requires the continuous manning of all transfers.

Components have been labeled with identification numbers. However, at this time, signage is not in place to meet WAC-173-303-640 (5) (d) since IDF will not be used for disposal of waste in the near future. The management of non-leachate precipitation water does not require WAC signage.

Based on site inspections, and the review of available construction records and related vendor submittals, TGS concludes that the Leachate Transfer Building ancillary equipment is adequately installed and passed tightness testing to meet its WAC-related functions, as evaluated in the design assessment report.

2.6 Truck Loading Station and Ancillary Equipment

Table 1 includes the inspection records for the Truck Loading Station and ancillary equipment.

2.6.1 Truck Loading Station Foundation (including sumps)

Review of subgrade moisture content and density construction records indicate that the subgrade was prepared in accordance with the Construction Specifications. The reinforced concrete sumps, foundation slab, and curbs were sequentially placed as required by the design. The design required water-stops are installed at construction joints. Appropriate water-stops were installed at all required construction joints. LinkSeal® mechanical sleeves were installed at each HDPE pipe penetration at the sumps. The surface contour with appropriate slopes was finished to drain liquid to the sumps. Concrete surfaces were coated and tested in accordance with the Construction Specification including incorporation of the grit blast material between second and primary coats to provide a non-slip surface. The sumps passed leak tightness testing.

Components have been labeled with identification numbers. However, at this time, signage is not in place to meet WAC-173-303-640 (5) (d) since IDF will not be used for disposal of waste in the near future. The management of non-leachate precipitation water does not require WAC signage.

Based on site inspections, and the review of available construction records and related vendor submittals, TGS concludes that the Truck Loading Station Foundation (including sumps) is adequately installed and passed tightness testing to meet its WAC-related functions, as evaluated in the design assessment report.

2.6.2 Truck Loading Station Ancillary Equipment

Truck Loading Station ancillary equipment includes the upright structural steel truck loading connection, valves (219A1-LH-V-036 and -037), galvanized steel pipe (including heat trace and insulation, as required), and sump covers (including coating). Inspection of this equipment verified that it is installed as required by the design.

The WPS, WPQ, and PQR associated with the upright structural steel loading connection welds were reviewed and found to be acceptable. The upright loading connection welds were verified and construction records for the coating document acceptable application. The upright loading connection was installed in a reinforced concrete base. The galvanized steel pipe is adequately attached to the truck loading connection with hangers and has passed the required hydrostatic pressure test. Valves were successfully functional tested. Solid sump covers are in place to prevent precipitation in-flow to the system. Grated sump covers were verified to be on site for use during truck loading. TGS has confirmed with CHG that IDF Operations will provide the truck appropriate connection (that meets the permit requirement) for the transfer of liquid from the 4 in. quick-connect coupling to the transfer tanker truck.

Above-ground HDPE piping (219A1-4"-LT-037) is insulated and heat tracing is installed.

Components have been labeled with identification numbers. However, at this time, signage is not in place to meet WAC-173-303-640 (5) (d) since IDF will not be used for disposal of waste in the near future. The management of non-leachate precipitation water does not require WAC signage.

Based on site inspections, and the review of available construction records and related vendor submittals, TGS concludes that the Truck Loading Station ancillary equipment is adequately installed and passed tightness testing to meet its WAC-related functions, as evaluated in the design assessment report.

3.0 NON-CONFORMING ITEMS AND INSTALLATION REPAIRS

This section identifies installation activities that deviated from the Construction Specifications. Deviations (non-conformances) resulting in repairs are identified in Table 2 as required by WAC 173-303-640 (3) (h). Table 2 also provides the list of items, pertinent to IQRPE scope, identified by the construction contractor during installation which did not initially conform to Construction Specifications but did not require any repairs. TGS has reviewed each item and concurs that all dispositions are adequate to support tank system certification.

Table 2. List of Leachate Tank System Related Dispositioned Non-Conforming Report Items

NCR	Component	Description of Non-Conformance	Disposition
-002	219A-12"-LHCP-049-HDPE (SLDS riser)	Interior weld beads were not removed according to the Construction Specification	Disposition: Use as-is. Technical Justification: Insertion testing was completed without complications.
-005	219A-12"-LHCP-049-HDPE (SLDS riser)	A section of the riser pipe was gouged in excess of that allowed by the Construction Specification during coverage (one area the wall thickness was penetrated completely). It is required that any pipe with flaws deeper than 25% of the nominal wall thickness be rejected.	Disposition: Repair Pipe section replaced with a new section and attached by a single butt fusion weld. Interior bead is to remain intact as allowed by NCR-002. Pump and transducer insertion/extraction tests were successfully performed.
-008	Cell 1 Crest Pad Building bottom of sump slab	Concrete was tested and found to contain less than 4% air content. The Construction Specification requires 4% – 6%.	Disposition: Use as-is. Technical Justification: Sump slab base is below grade and not subject to changing environmental conditions.
-011	Cell 1 Crest Pad Building walls	Concrete was tested and found to contain less than 4% air content. The Construction Specification requires 4% - 6%.	Disposition: Repair Repair exterior exposed concrete walls by application of an acrylic copolymer sealant coating. Primary concern is the durability of concrete exposed to freezing conditions. Only outside walls will be exposed. Air content field results are within the American Concrete Institute recommended air content range.
-013	Cell 1 Leachate Tank secondary liner	Secondary liner was accepted following all required testing and repairs. During filling for electronic test of the primary liner, it was determined that the secondary liner was not water tight.	Disposition: Rework/Repair Original secondary liner was removed and replaced with the original primary line per a revised installation and testing plan as approved by CHG. A new primary liner was ordered.

NCR	Component	Description of Non-Conformance	Disposition
-015	Cell 1 Leachate Tank "new" secondary liner	"New" secondary liner failed liquid dye leak test. Dye was observed at a location at the foundation below 219A-3"-LH-030-HDPE.	Disposition: Rework/Repair Leak was located and repaired. Additional liquid dye testing verified that no leaks exist.
-016	Cell 1 Leachate Tank primary liner	The primary liner was determined to have 14 possible or potential leak paths based on the results of additional electronic leak testing,	Disposition: Rework/Repair Leaks were located and repaired as required by the Construction Specifications. Dye testing was used in the space between the primary and secondary liner to confirm integrity of primary liner around lower penetration. Successful completion of the CAT 30-day tightness test confirmed primary liner integrity.
-017	Cell 1 Concrete Paint Coating System	The pull test apparatus utilized for initial Construction Specification testing did not meet the specified accuracy requirement.	Disposition: Rework/Repair Construction Specification testing was repeated utilizing calibrated gauges. Testing resulted in either the coating meeting the acceptance criteria or concrete failing above the acceptance criteria; with one exception, where the concrete failed just slightly below the 8% concrete compressive strength acceptance criteria. A range of 6% - 8% is recognized as acceptable by ASTM D4541. The anomaly was above the 6% and was determined to be acceptable. Coating repairs were made on all areas where concrete failed.

NCR	Component	Description of Non-Conformance	Disposition
-018	Cell 1 Tank Foundation	The Construction Specification required concrete slump to be between 4 ½ in. and 8 in. for class 40 and class 50 concrete. Pour No. 50.9 was one of nine truckloads for the tank foundation, and its slump was measured as 4 3/8 in.	Disposition: Use as-is Typically, slump is not utilized as an acceptance criterion when water cement is specified and met.

Table 3 provides a list of items that were reworked or repaired during installation. TGS has reviewed each item and concurs that dispositions are adequate to support tank system certification.

Table 3. Items Identified Which Were Repaired During Installation

System Identifier	Item	Description	Disposition
Combined Sump	Pump 207 check valve	219A1-LH-CV-030 did not close properly during component construction acceptance testing.	A factory installed counter-balance option was added to the same model check valve. The valve was confirmed to work (both to open and shut closed) during system construction acceptance testing. TGS concurs with this repair.
219A-201 Leachate Storage Tank	Powder-coated, galvanized steel, corrugated plates	Coating was scratched or missing at numerous places on inside and outside panels and at field drilled wind girder vertical attachment holes	Identified areas were prepared and repaired with white Rust-Oleum® paint using cold weather painting procedures. TGS concurs with this repair.
	Powder-coated, 3"x5"x1/4" base angles	Coating on inside hole was damaged during field placement of anchor bolts	All coatings were repaired with white Rust-Oleum® paint using cold weather painting procedures. TGS concurs with this repair.

System Identifier	Item	Description	Disposition
Truck Loading Station	Upright truck loading connection	Coating has been damaged in several places during shipping and installation	All damaged sections of coating have been repaired. TGS concurs with this repair.
	Construction joint between main slab and concrete placement for the upright truck loading connection	Carboline coating did not adhere to the construction joint fiber board. Coating peeling was visible.	Approximately ½ in. of fiber board was routed out and crack was filled with flexible caulking material. TGS concurs with this repair.

4.0 EXCLUSIONS

Leachate Tank System signage is not in place to meet WAC-173-303-640 (5) (d). Signage is required prior to introduction of dangerous waste.

5.0 CERTIFICATION

The installation for the Leachate Tank System as identified in Section 1.2 of this report has been assessed. System design and installation, based on the data and premises provided in this report, are in compliance with WAC 173-303-640, as applicable, and has sufficient structural integrity and is acceptable for the storing of dangerous waste with the exclusion listed in Section 4.0. The certification below is in accordance with the requirements of WAC 173-303-640 (3) (h) and 173-303-810 (13) (a).

Report Lead IQRPE:

I certify under penalty of the law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment for knowing violations.

10/24/06

Approved:

Robert L. Goodman, Jr., PE

Robert L. Goodman, Jr., PE

Chief Engineer, TGS

24 Oct 06.

Date

6.0 REFERENCES

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